REMARKS

Reconsideration and allowance of the above-referenced application are respectfully requested. In the amendment, the specification has been amended to correct certain typographical errors; Claims 6 and 12 have been canceled; Claims 1, 5, 7, 8, 9, and 16 have been amended; and Claims 17-29 have been newly added based on the original specification. No new matter is added.

Claims 1-3, 5-10, 12, and 16 stand finally rejected under 35 USC 112, first paragraph, as allegedly being indefinite. These rejections should be withdrawn in view of the following arguments and the above claim amendment.

The Final Office Action contends that Claims 1 and 16 fail to define the structure of the core portion forming the resonator and the material that is used to make the cladding layer active. In both claims, however, the structure of the core portion is specifically defined as part of the disk-shaped resonator. Hence, both Claims 1 and 16 are definite in this regard. As for the material of the cladding, Claims 1 and 16 specifically define two material properties for the material. First, the material is an optical cladding for the core. In the field of the optical waveguides, this recited feature represents a specific relationship of the properties of the cladding

material with respect to the core material. For example, the refractive index of the cladding material is generally less than the core material to effectuate an effective waveguide. Second, the material is optically active to produce an optical gain for amplifying light. Hence, to a person skilled in the art, Claim 1 and 16 recite these two features of the material for the cladding to particularly point out and distinctly claim the invention.

The Final Office Action also contends that Claims 1 and 16 are indefinite for failure in providing a structure that can introduce light into the core portion and thus are indefinite. Applicant respectfully traverses the objections to Claims 1 and 16 because lack of this structure does not render these Claims indefinite under 35 USC 112, first paragraph.

In implementations, the structure for introducing light into the core portion varies depending on the specific ways of using the device of Claim 1. For example, when the device in Claim 1 is used as a laser, light is introduced into the core by the active cladding and thus there is no need for a separate structure as contended by the Final Office Action. Claim 16 describes such a laser. FIG. 2 in the specification also illustrates an example of such a laser. For another example, a waveguide may be used to introduce light into the core portion as shown in FIGS. 1 and 3. Hence, from a point of view of a

person skilled in the art, the mere absence of a structure specifically designated for introducing light into the core, does not lead to the lack of a mechanism for introducing light into the core. Therefore, Claims 1 and 16 are definite for the recited features based on the specification. It is respectfully requested that the rejections be withdrawn.

Claim 8 has been amended to recite an optically inactive waveguide core and to specifically describe the amplifying through optical pumping of the optically active waveguide cladding. Hence, the rejection has been overcome.

We now turn to rejections based on prior art references. The Final Office Action cites Ho and Po to reject all pending claims prior to this response under either 35 USC 102(b) or 103(a). Applicant respectfully requests such rejections be withdrawn in view of the following remarks.

Ho describes a micro resonator 12 in FIGS. 1A and 1B. The core 30 of the resonator 12 is GaAs and the cladding layers 28 and 32 are AlGaAs. It is known that AlGaAs has a refractive index lower than that of GaAs due to the presence of Al in AlGaAs. Hence, Ho uses AlGaAs as a cladding for the GaAs core.

However, Ho fails to disclose the cladding AlGaAs as an optically active material for producing optical gain and amplifying light. Throughout the description in Ho, the micro resonator 12 is described as a *passive* optical resonator filter

to passively filter light that is directed through the resonator 12 by input and output waveguide couplers. In FIG. 10, Ho describes applying an electric field to the resonator 12 to tune the resonance frequency by changing its index and thus the effective optical cavity length. As the Patent Office may appreciate from the teaching by Ho, this tuning mechanism does not amplify or generate light. Therefore, Ho fails to suggest that the resonator 12 itself amplifies light or generates light. Ho certainly does not teach in any way the recited active cladding feature in the present claims.

Based on Ho's disclosure, Applicant respectfully submits that the rejections based on Ho lack any support from Ho and thus are improper.

In support of the rejections based on Ho, the Final Office Action alleges that the cladding layers 28 and 30 in Ho are made of AlGaAs and as such are "optically active." This contention, however, appears to be based on an incorrect understanding of the semiconductor photonic materials. In photonics, it is well known that GaAs is generally used as an active optical material to produce light in LEDs or laser diodes. The AlGaAs has a higher band gap than GaAs and is used as a barrier layer for the GaAs with a lower band gap in a heterojunction design. Hence, in a structure of AlGaAs/GaAs/AlGaAs, the AlGaAs layer is not an active layer. More specifically, Ho uses AlGaAs for its lower

index than GaAs as a cladding layer, and the compatibility of AlGaAs with GaAs for ease of fabrication of the waveguide layers shown in FIG. 1B. Nothing in Ho describes or suggests making the cladding layers AlGaAs, instead of GaAs sandwiched between two cladding AlGaAs layers, to be optically active.

In view of Ho's entire disclosure, it appears that the Final Office Action cites Ho based on a hindsight with the benefit of the disclosure of the present application. This is impermissible under 35 USC 102 and 103 and provides an independent basis for withdrawing the rejections.

Turning specifically to Claim 1 as amended, a silicon core portion in a silicon material and an optically active cladding are recited. Ho certainly fails to teach each of these two features based on the preceding remarks.

In addition, Claim 1 as amended recites "said silicon material fabricated to include a microelectronic structure." Nothing in Ho suggests this specific structure based on silicon.

Therefore, Ho fails to teach several features recited in Claim 1 as amended. Accordingly, Claim 1 as amended is distinctly different from and is patentable over Ho.

The use of the silicon for the core portion has a number of advantages. The recited waveguide resonator with active cladding can be directly fabricated on the silicon wafers. One obvious advantage of using silicon as the waveguide core is to

utilize existing silicon-based technologies to fabricate this device on silicon. In particular, the recited feature of combining the silicon core portion and the integrated microelectronic structure in Claim 1 as amended allows for monolithic integration of both optical and electronic components on the same silicon substrate by using well-developed silicon IC fabrication technologies such as MOS and CMOS processes. This invention may be used to build complex integrated photonic circuits and systems at low cost with high reliability. Nothing in Ho or any other cited reference suggests this aspect of the invention.

The Final Office Action further uses a combination of Ho and Po to reject Claim 3 as being obvious. As discussed above, Ho fails to disclose several features in Claim 1 as amended on which Claim 2 is dependent. Admittedly, Po suggests in a very general way that the fiber cladding may include a gain material. However, Po certainly does not provide any disclosure that cures the voids or defects in Ho's disclosure for supporting the contended rejections in the Final Office Action. Hence, the alleged combination of Ho and Po falls short of disclosing several features in Claim 3 as discussed above. Therefore, Claim 3 is patentable over Ho and Po.

Claims 2, 5, 7, 8-10, and 16 are patentable based on the above arguments as well as on their own merits. For example,

Claim 8 has been amended specifically to recite a method that uses inactive silicon core and optically active cladding to amplify resonant light. Claim 16 as amended recites a laser using an inactive core material surrounded by an active cladding material. Cited prior art clearly does not teach these features.

New Claims 17-29 have been added and are fully supported by the original specification. Based on the above analysis and remarks, these new claims are clearly patentable due to their distinctive merits.

In view of the above amendments and remarks, therefore, all of the claims should be in condition for allowance. A formal notice to that effect is respectfully solicited.

Please apply the $149 extra claim fee, and any additional charges or credits, to Deposit Account No. 06-1050.

Respectfully submitted,

Date: October 21, 2003

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